BEFORE THE STATE OF MAINE PUBLIC UTILITIES COMMISSION

In the Matter of the:

Docket No. 2019-00015

COMMISSION INITIATED INVESTIGATION OF METERING AND BILLING ISSUES PERTAINING TO CENTRAL MAINE POWER COMPANY.

Direct Testimony of

Lauren Loomis

With Regard to

Central Maine Power Metering and Billing Investigation

August 30, 2019

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I. Introduction and Overview

Introduction

My name is Lauren Loomis. I am a current Central Maine Power customer and an Administrator for a Facebook Group CMP Ratepayers Unite. We have about 10,000 members who are customers of Central Maine Power who have experienced unexplained high spikes in usage and/or billing defects since the go live of SmartCare.

Q. Please summarize your professional and educational experience.

A. I have 5 years of customer service experience between 2004-2009. Two of those years I worked in a call center receiving inbound calls where I held sensitive but unclassified clearance while working at the National Passport Information Center, Dover, NH, between April 2007-February 2009. I understand the importance of keeping customers information private. I have had schooling for Computer Support Specialist from Blended Solutions Institute LLC February 2009- April 2009. I'm currently an Administrator for CMP Ratepayers Unite since May 2018.

Q. On whose behalf are you testifying in this case?

A. On behalf of myself and members of our group who have given me permission to use their information with my findings.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to present my findings of the billing defects and metering

anomalies that could be a contributing factor for the high usage complaints customers have been reporting and disputing. I'm also requesting that the compensation for customers and any damages customers received from the metering anomalies and billing issues be handled outside of the MPUC and in the courts. Compensation for any damage or harm done to a customer is not handled by the MPUC and is outside of their jurisdiction. The class action lawsuit should be able to proceed along side the MPUC investigation as both would be dealing with separate issues affecting customers. There should be no reason why delaying compensation to affected customers should continue being delayed.

Summary of Conclusions and Recommendations

My primary conclusions come from my analyst of attachments **TLCG-001-038_Attachment_4_CONFIDENTIAL_(2018-052)** and **ODR-003-016**, manuals from the FCC on the smart meters Central Maine Power uses, and the manual of the Teridian microprocessor used within the smart meters, the Company's emails, SAP.com, and the multiple data requests made on this docket. My recommendations are based on my findings. It appears customers may have been impacted by either a metering anomalies or billing defects, errors, or a poorly designed work around.

Billing:

- Customers' usage appears to have been inputted by a manual meter reading by entry or performed by batching being coded as a "**Meter Reading by Entry"**.
- A "**Meter Reading by Entry"** began at or before the cutover of SmartCare and continued into July 2018. I could not verify when this type of meter reading was no longer performed due to the limited scope of the Audit that was performed. The data provided was limited to a time-frame set by the Maine Public Utilities Commissioners.

- The "**Meter Reading by Entry"**, "**Send MR Request Confirmed"**, and "**Receipt of MR Confirmed"** are coming from a "**Not Specified Source System"** instead of the "**AMI Infrastructure"**.
- Some of those manual meter readings appear to have been inputted improperly causing erroneous meter readings being billed to customers.
- In other cases some non-billing meter readings were being used for billing purposes. This would have also created an erroneous meter reading being used for customers bills. These bills were also mailed to customers.
- The "**Send MR Request Confirmed"** and "**Receipt of MR Confirmed"** imply the meter readings are coming from an email source.

FAST CLOCK ANOMALY:

- Is actually 1 of 3 Default Battery Operating Modes
- Meters operate as a default demand meter and not a 1s meter in the "**Fast Clock"** mode.
- Affects all meters without a backup battery.
- Occurs every time there's a Sag event, grid switching, or power outage.
- The Company did not upgrade the meter firmware to allow the meters to operate in battery free or battery less operating modes as required to allow the meters to operate in battery free mode.

REGISTRY ANOMALY:

- Appears to only affect GE meters
- Occurs due to not having the updated firmware to allow meters to operate in battery free or

battery less operation modes.

- Occurs when the voltage to the meter drops below the required level the meter needs to operate due to a sag event and prevents the meter from going into the default battery operating mode before the EEPROM chip has time to finish its reboot.

COMPENSATING CUSTOMERS:

- Implement the VEE standards on the upgraded MDMS or use the Legacy system to perform automated data processing of suspect data.
    - Compensation for damages and harm done to customers should be handled at the Supreme Court.
- Review all high bill complaints accounts again but do not allow Central Maine Power the option of providing their own records.
- Review all customers accounts who receive a "**Meter Reading by Entry"** that was used for billing purposes.
- Reimburse all customers accounts affected by a billing defect, an inaccurate "**Meter Reading by Entry"** reading, or metering anomalies.
- Reopen and investigate all closed disputes by a third party who will retrieve their own data from CMP and not allow CMP to provide them the data on customers accounts.

My primary recommendations include the following:

- Hire the necessary employees to perform field upgrades of the meter's firmware, if the over the air upgrades fail.
- Monitor the over the air upgrades and require progress reports.
- Audit the AMI network and meters again and investigate why my findings weren't found during the first audit.
- Use a shadow meter on high usage complaints accounts to monitor the complaint meters accuracy.
- Bring GE/Alcara and Landis & Gyr Employees in for questioning and for a more understanding of the meter anomalies.
- Re-bill Customers for over-billing them up to 6 years prior to November 2017 to present.
- Require the MDM system be installed with Validating, Estimating, Editing (VEE) software and set strict standards for the use of VEE similar to the California Public Utilities Commissioners have in place for their utilities.

- If a customer was under-billed by meter anomalies, which is highly unlikely, the Company would need to accept it as penalty for not understanding the importance of having and using the VEE software on their MDMS and allowing the metering anomalies to continue for over 9 years.

- Require CMP to open a temporary welcome center for customers to allow them the option to have their bills reviewed with a CSR. The re-billing and presentation errors are confusing to both customers and a CSR.

Organization of Testimony

My testimony is broken up into separate categories covering the different types of metering and billing issues that would have impacted customers bills and usage.

Exhibits:

LOO_Exhibit_A_GE I_210_c Electronic Meter Manual

LOO_Exhibit_B_Landis Gyr E330 FOCUS AX and E350 FOCUS AX-SD Manual

LOO_Exhibit_C_ LG meter Usage Conf

LOO_Exhibit_D_Wrong Meter part 1

LOO_Exhibit_D_Wrong Meter part 2

LOO_Exhibit_E_part 1_Teridian Models 71M6533_G_H and 71M6534_H Data Sheet

LOO_Exhibit_E_part 2_Teridian model 78M6618 Final Data Sheet

LOO_Exhibit_F_Teridian Meter Design for Power Failure Events

LOO_Exhibit_G_Meter Test_Confidential

II. SmartCare

Billing

Customers continue to receive billing errors on their bills, multiple bills with different amounts and due dates for one month of billing, and some continue to not receive their bills. What is currently being the most reported complaint by customers is for an unexplained high spike in their usage. For the 40 complaint customers discussed in the internal audit reports performed by Central Maine Power, it is apparent that due diligence into finding the root cause of a high bill complaint was not performed. The Company has stated during a few of the technical conferences that they did not look into the customers usage of those who had a high bill complaint but instead the dollar amounts on their bills Another problem with their internal audit is if you do not understand how SmartCare operates or what the software billing codes mean, you will miss some important information on a customer's account.

On ODR-003-016, I'm noticing many of the 40 customers' accounts did not have their usage from the Head End System (HES) validated. Some accounts have one or more-meter readings entered as a **"Meter Reading by Entry"** code for customers who have a smart meter. A meter reading by entry is typically a manual meter reading an agent would enter into the Smartcare system. All of the accounts had their October 2017 readings manually entered and some were entered manually again in March 2018. The manual readings would be similar to inputting the manual readings for electromechanical meters. These readings could have been inputted

erroneously by human error causing a too low or too high reading that would have affected future meter readings once Smartcare was communicating again to the HES. For example, on Tab 23 this customer's account is off from its previous usage over the past 4 years. The usage had doubled over the years. The customer posted copies of their bills onto the MPUC website under docket no: 2018-00052. After reviewing their usage it's apparent their October meter reading was manually entered, and the reading does not match what her meter should read. Their meter reading seems to be off by one decimal or has an extra number added. This could be because the meter was reset to zero at some point between December 2016 and February 2017 and when the account was added to SmartCare whomever loaded the information used an older meter reading. The reading is stating the customers meter reading on October 14, 2017 was 113952.000 and if you minus the meter reading on the customers Feb 21, 2017 where the customers meter read 2,259 and divide by 8 months it would appear the customer used on average 13,961kwh each month.

113952 - 2259 = 111693/8= 13961.625

If you simply move the decimal over to the left by one place you will get a reading that is more in line with the usage the customer has had for the past 4 years of an average of 1142kwh a month.

1139 – 2259 = 111693/8= 1142

I would need to see this customer bill before the cut-over of Smartcare to get a more accurate monthly average but its apparent the meter reading is off on this customers account. I would assume it's a human error, but the error continues with the AMI monthly readings. This needs to be looked into further to figure out if it's a human error or a coding error and why would those

readings continue to be off.

After comparing tabs 30 and 32, these customers appear to have very close meter readings entered in the system for their October 2017 usage. Now understanding the Smartcare billing codes will help in understanding what may be affecting customers' accounts. A code RR 06 means a customer has moved in. Most customers did not move in during the cut over, but this is simply how the program works when you need to set up a new account from the old legacy system or when you have to make changes to the account. A code RR 09 means a non-billing interim meter reading was performed. It appears to me the first readings that were entered into the new billing system back in October 2017 may not have been accurate. When you have a code RR09 and a MT 10 code this means a customer is complaining about a high bill and the agent requests a meter reading from the system for non-billing purposes. With this reading the usage appears either higher or close to the last meter reading suggesting the usage dropped back down to normal at some point during the high usage complaint or may appear that the erroneous readings were accurate when in fact they did not match the customers usage. This can be seen on Tab 17. This would also explain why some customers reported their usage went back to normal after filing a complaint because the system was using an actual meter reading after they called.

I'm also seeing code MT 03 on some accounts. Which indicates the meter reading was an estimated reading. This code is appearing on a customer account with a smart meter, but the bills are not stating they were estimated nor is it being stated on the HES or MDM readings on the data the company provided for some accounts. For Tab 2, this customer's smart meter was supposedly being read in the field, and the customer had complaints of high usage. They received an estimated bill for their November 2017 bill, so their December bill appeared higher. This customer has code RR 22 which would mean their meter was replaced but the meter number

is the same. It does appear the smart meter is not transmitting to the office. On ***Figure 2.1A*** below, I have attached a screenshot of a customer's account showing the various codes used for billing and highlighted where the codes can be found. The red box indicates what type of meter reading is being performed, the blue indicates if it from the billing software, a demand reading or, an estimated reading, the yellow box indicates if these meter readings were used for billing a customer. The red arrow is showing an actual meter reading from the AMI network. Some of the interim meter readings, code RR 09, appears to have been billed to customers. I've attached a screenshot below showing what a RS 7 code means under ***Figure 2.1B***. This might explain why some customers reported receiving a bill twice in one month.

Figure 2.1A

Figure 2.1B

Some of the screenshots the Company provided were cropped leaving out some important information about a customer's account. For example, if the customer's meter reading was in fact from the AMI it would be stated on the account. Many of the 40 accounts had meter readings entered into the system either manually by an agent or by a batching job. Judging from some of the accounts, it appears the system might be running a code or a batch job to generate estimated readings versus actual meter readings and coded as a manual meter reading, considering many were entered at midnight which is outside of the company's working hours. Since the code or batch job could be programed to indicate the readings were a manual reading, this would appear to be the customer's actual usage when in fact it's estimated. The software has an automated program which is capable of this and is mentioned on Tab 24. Also on Tab 24 there's mention of one function of the program which would change a meter reading source from the AMI network

to the Field Collection Service after 2 estimated meter readings. This customer's account was also billed for an interim meter reading with a high bill complaint. Also On Tab 24, the customer has stated their usage went back to normal after they filed their dispute. Comparing their usage from their May 2018 bill it appears this customers usage was inputted incorrectly since the go live of Smartcare when the dispute was filed. Looking at their usage for their high bill in January 2018, it would appear this customer usage was underestimated for two billing cycles so their high increase would be explainable. But if you look closer it's apparent that the total usage the customer was billed for on their January 2018 bill doesn't add up. The usage does not match the usage on the past 9 months of bills. If you take the total usage for January's bill and divide it by 9, the customers daily averages on their graph should be much higher. This customer ended up being told their bill was accurate and had no choice but to pay it. If the Company took the time to do a thorough job of finding a root cause this customer would have been able to have their account corrected by an erroneous meter reading by entry. On Tab 15, this customer received 3 bills for October 2017, One was a RR 06 and a MT LG meaning a move in with a credit, next was an estimated bill and another RR 06 move in reading that was billed. The two move in meter readings shouldn't have been used for billing.

On Tab 34, CMP states the following; "Customer appears to have made inaccurate statements to MPUC", "Based upon invoices provided by CMP, customer did not have $275 invoice as stated in her complaint to MPUC. Per the SAP screen, the customer does have a smart meter." If the Company did their due diligence they would have noticed this customer does in fact have a non smart meter, and her bills were being estimated. The data the Company provided does not match the bill the customer received. I have provided a copy of the bill as LOO_Exhibit_D_Wrong Meter. The Landis & Gyr meter on the account appears to not exist. I'm unable to find it the list

of meter test dates. I have attached those meter test dates as LOO_Exhibit_G_Meter Test_Confidential, I'm unable to locate the original file name on the docket. It's important that all customers who filed a dispute have their meter checked in person to make sure the Company is reporting the correct information on the customer's account and that the usage is matching what is being inputted into SmartCare. I'm concerned about the snapshot of this customer's account considering it's of the Company's billing system but the customer's account name is wrong, the meter is wrong, the read dates and usage doesn't match their bills. It appears CMP is using the usage and meter from this customer's rental property. It appears their usage doubled since September 2017 at their residential home but the usage is mimicking their rental property usage. Why was this not found? Not only was this customers dispute not resolved but it was never properly investigated. On TLCG-001-073_Attachment_2_CONFIDENTIAL_(2018-052) it's mentioned their meter was tested and came back accurate but their meter on the spreadsheet of meter test dates is showing the meter wasn't tested.

Customers continue to have their disputes closed and being forced to pay for bills that aren't making any sense to them. How many disputes are being closed with inaccurate information? The CASD needs to stop taking CMP at their word and start listening to customers. Someone needs to be actively meet with customers who are filing complaints and physically see the bills these customers are receiving and to verify the meter and the usage is what's being reported to them by CMP. CMP shouldn't be allowed to continue to provide customers account information since it appears they can alter the data. All closed disputes should be reopened and investigated again.

For proof of this occurring and impacting customers usage, a customer recently contacted me about their complaint. They stated that someone from the CASD had called them and informed

them that their March 2018 bill was in fact incorrect due to a manual meter reading being entered on their account. I strongly suggest complaint accounts are investigated more thoroughly to see who was impacted by the manual meter reading by entry and have their accounts corrected. The reasoning behind the Company using manual meter readings needs to be explored further. Why is it a planned work around or did it have something to do with the October 2017 Windstorm, considering many of the high bill complaints were in areas that were also hardest hit by that storm. Many poles came down which caused AMI equipment to be damaged in the process. Was the Company unable to read meters due to the damaged equipment?

If the Company did in fact planned to launch SmartCare with defects that would have required them being unable to attain actual meter readings from their AMI infrastructure for customers meter readings and needed to use a workaround which used estimated or manual readings, needs to be further looked into on how and why this was performed. Due to the SmartCare software limitations the software shouldn't be used for calculating customers usage for estimated bills. Why was this overlooked by the Company? Why did they not catch what I'm seeing on the 40 accounts they audited? On their implausible meter reading accounts? Using estimated readings and marking them as a manual reading would create high bill complaints and confusions. Doing so would appear as those the estimated readings were the actual usage of the customer when they were not.

The Company would need to review each customer's accounts who filed a high bill complaint and perform an Auto-interpolation between the last time a meter reading was read from the AMI infrastructure to when the billing system started reading from the AMI infrastructure again. This would replace any erroneous meter readings that were entered incorrectly or any estimated readings that were used. The Company would need to review every customer account that were

not receiving meter readings from the AMI infrastructure and adjust their accounts accordingly.

SMARTCARE LIMITATIONS

If the Company SmartCare wasn't using actual meter readings and they used a planned work around at go live that would use a code to estimate customers usage for bills and input those readings as a manual meter reading by entry would be a problem. First, their software is not intended to have their estimated meter readings used for billing purposes. Furthermore, there have been some conflicting statements in regards to CMP using VEE (Validation, Editing and Estimating) standards on their MDM system. Liberty responded to my Data Request LOOM-001-018 stating CMP does not implement the VEE standards and relies on their new SmartCare for validation and estimates. CMP is stating they did implement it. My response to CMP-008-028 explains further the limitation SmartCare has with validating, estimating usage, and why it shouldn't be used for Time-Of-Use rates.

"CMP-008-028

Q. Refer to Direct Testimony of Lauren Loomis, page 21: Please state in detail the basis for the statement that: "The new system will not be able to validate hourly interval data for time of use options unless the VEE frameworks are put back onto the MDM system that is integrated in the MDM system and should be idealised."

A. On LOOM-001-018, Liberty states "CMP has not implemented VEE (Validation, Editing and Estimating) standards. CMP relies on its SmartCare billing system to validate

meter reading data based on pre-defined tolerances and validation routines. Any meter data found to be out of tolerance gets flagged as implausible, which prevents the reading from being used for billing." SAP is an open source software and provides open forums or blogs on their website for their clients and the public to access. One post states how SAP for Utilities allows the client to enter and change VEE codes at register level and states that the VEE code is used for information purposes only and is not used to validate meter readings. VEE codes are not evaluated in SAP for Utilities, and are only evaluated in external systems . The VEE process on the Itron's MDMS not only validates interval data but also the registered meter reads. The Department of Energy states when data that has not gone through the validation process it is considered raw data. If the data is provided for informational purposes only validation is not required and the raw data may be used directly. If the data is to be used for billing purposes, also known as the settlement process, the data must go through the VEE process. Data validation checks are designed to identify things that can go wrong at the meter or local data acquisition system and cause the data collected to not reflect the actual consumption. On the March 27, 2019 Technical conference I asked "I had one question. I'll see if he can answer that for me. I'm just wondering, considering on the Liberty responses, you know, the hourly interval data isn't accurate or being validated as accurate, will this be a disadvantage to customers on the time-of-use rate or is CMP validating the hourly interval data differently than what was stated in the Liberty responses?" "MR. RUBIN: I can answer it very generally. If a utility is not providing accurate interval meter reading data, then time-of-use rates should not be offered. And that's about as far as I can go. I don't know anything about what Liberty is finding or, you know, issues on the metering side of the inquiry. But I would just say, if

there are concerns about the accuracy of interval metering data, then, you know, a time-of-use rate or a demand rate should not be offered until those concerns are resolved. " Also refer to my responses on CMP-008-027 and CMP-008-026 which goes over the validation process and tolerances check the SAP Utilities provides. You can find my above statement reference about SAP VEE codes here: https://help.sap.com/viewer/35e865264f0d401cb9f1757d04ccdf8c/6.06.22/en-US/399c192a1cea46659735e5f2b26a0c6c.html"

If it is true that CMP did not implement the VEE standards on the MDM then the concerns with the accuracy of interval metering data needs to be resolved and looked into further for any billing impacts that may have affected customers.

III. Metering Anomalies

Fast Clock Anomaly

First I would like to start with The Liberty Consulting Groups statements on the Fast Clock Anomaly. The report states "**Events in early 2018 led to CMP's meter manufacturer advising CMP that what was known by CMP to be Clock Drift may in fact be a different condition, now known as the meter anomaly. In March 2018, a daily system report showed 352 meters in a common geographical area in what appeared to be Clock Drift mode. Given the larger than usual number of meters in this state, CMP began investigating, including calling upon its meter manufacturer for assistance in understanding the large number of meters in Clock Drift mode. CMP had extensive discussions with the**

manufacturer over the next several months, working to identify the root cause of the issue and potential customer impacts (see Confidential Attachment 1 to TLCG-018-134), which documents the communications between CMP and GE/Alcara. On June 15, 2018, Alcara provided to CMP its White Paper, provided herein as Exhibit 2, which identified that the meter situation which CMP had known to be Clock Drift could in fact be meters in an anomalous state, which could result in errors in the amount of usage being recorded. Alcara recommended that I210+c meters be upgraded to firmware 6 release 7.0 or higher to eliminate vulnerability to the meter anomaly. Liberty notes on page 22 of its Audit Report, "We do not find substantial documentation of management's awareness of the GE meter issues or efforts to address them until 2014."

I would like to point out that the White paper or Exhibit 2 that CMP provided along with their Testimony is in regards to GE I-210+c meters that currently has a backup battery installed. The Company has stated numerous times, as well as Liberty, that the meters do not have backup batteries installed. Now if those batteries were installed, then what CMP has been providing for the "fast clock" anomaly would be correct. Since the meters do not have those batteries installed the anomaly is slightly different. The difference is when there is a power event, outage, or sag event, instead of the meters randomly going into a "Fast clock" the meters will go into one of three default battery operating modes. What is currently being reported as a "Fast clock" is actually a state the meters enter into. For the documentation the Company proved as the root cause of the erroneous operation mode would only be true if the battery was present and experienced a low voltage reading from the battery upon the power being restored. When the battery is not present the meters will automatically enter the third battery operating mode. For the GE meters, this mode is called SLEEP or SLP mode. For the Landis & Gyr meters this is called

STAND-BY mode. If the Company is currently using Encoder Receiver Transmitter (ERT) meters they will also be affected by this anomaly and this would link all of the complaint meters. I have broken up my testimony of the meters into parts and will explain how each meter is affected by the fast clock anomaly.

The company should have been made aware of these operating modes when they first purchased the smart meters. Considering at the time the Company did communicate to GE about having the meters operate in battery free operation/mode, GE should have known at the time what the default battery operating modes were and would have needed to provide CMP with the information needed to allow the meters to operate battery free or battery less. For the company to be able to allow the meters to operate in this mode they would have needed to upgrade the meters firmware and their software. These updates would have allowed them to select an option on their IEEE portal to enable the meters to operate in battery less or battery free mode. CMP did not do this. Instead, CMP had the low battery or error 002 code disabled as shown in ***Figure 3.1***.

Figure 3.1

In another email it was mentioned how the battery free operation mode worked and how it would restart the Load Profile. There's mention of a presentation and 3 modes to pick from. As seen in ***Figure 3.2.*** The Company should have been made fully aware of the 3 battery operating modes

as far back as December 05, 2013.

Figure 3.2

[redacted]

GE SLEEP MODE

Q. What is the GE "FAST CLOCK" anomaly?

The fast clock anomaly occurs when the meter is in one of three default battery operating modes and the meter needs to perform a soft reset to restart some components within the meter that were halted during a power outage or sag event. When the meter indicates the power may be lost the meter will save the meter data before transitioning into BROWNOUT mode, if there's a battery present. If no battery is present, by default the meter will automatically enter **SLEEP** mode. The event is recorded and notifies the operator of the event. When power is restored, or the sag event did not result in a power outage a signal is sent to the meter to bring the meter out of **SLEEP** mode or BROWNOUT mode into MISSION mode. MISSION mode means that the meter is operating with system power and that the internal PLL is stable. This mode is the normal operation mode where the meter is capable of measuring energy.

Q. Does this mean the meters are operating as a 1S meter?

No. By reading the manual, which I have attached as LOO_Exhibit_A_GE I_210_c Electronic Meter Manual, on the GE meters provided by the Federal Communications Commission, starting on page 50, states the seriousness of error events:

> "Errors are serious events and usually indicate a condition has occurred that may have compromised the meter data. Unless GE has issued a service advisory indicating that other actions should be taken, you should remove the meter from service and contact

your GE sales representative. The only exception to this rule is the Battery Failure & Power Loss error display, **Er 000 002**. Do not return meters displaying Er 000 002. The Er 000 002 display indicates that the meter lost time during a power outage because of a weak, missing, disconnected, or defective battery. **Replace the battery and set the meter's date and time to resolve this problem. If the meter has load profile data, the load profile recording function must be restarted. Be sure to read the meter's load profile data before doing this.**

Note: When the meter is read through the optical port, error and caution conditions are returned with the meter data regardless of what display options are chosen in the meter program."

Under **Section 4.13.1.1 Er 000002—Battery Failure & Power Outage** it also states the importance of restarting the Load Profile:

"The Battery Failure & Power Outage error indicates that the battery failed to maintain power during an outage. **The meter has reverted to a demand mode of operation. The meter will increment only billing summation and maximum demand values upon energizing the meter after loss of date/time information.** It will update these values for the overall quantities and the programmed default TOU rate. TOU operations are suspended. Load profile data accumulated prior to the loss of date/time information is stored in non-volatile memory. TOU and load profile data is available for reading via the optical port or remote communication link. The battery should be replaced after reading the meter electronically to extract the data. The time and date should be programmed to

resume proper TOU operations. **The load profile function must be restarted to restore load profile operations**. The meter can stay in service."

As mentioned above it states the meter will operate as a demand meter and not as a 1s meter.

Q. What does this mean?

The Company was supposed to be using interval meters which record consumption (kWh) and/or power demand (kW) over a specific time interval, for example, every 60 minutes. When the meter is operating as a demand meter a customer's usage will be measured in KW, kilowatts. The KWH portion of the bill is the total amount of energy that has been consumed for the billing cycle for which the bill was calculated. Demand on the other hand is the rate at which the energy is consumed. A customer's usage would appear to over register. For example, if you look at a 30-minute data with readings in kW, and you erroneously treat those readings as kWh, everything that is calculated further on will be twice what it should be. This would explain why such high spikes in usage due in part because the meter was recording usage as a demand meter. The meters will perform its own soft reset if it detects any variances in its set tolerances. This could explain why usage might spike for one hour or a few hours without being noticed by the Company when they performed their daily clock drift checks.

See the example in ***Figure 3.3*** of a Residential Customer Hourly Interval Usage with a High Bill Complaint.

Figure 3.3

19 12:00:00 PM	10	2.010
19 1:00:00 PM	10	1.929
19 2:00:00 PM	10	0.761
19 3:00:00 PM	10	8.508
19 4:00:00 PM	10	4.718
19 5:00:00 PM	10	2.904
19 6:00:00 PM	10	5.053
19 7:00:00 PM	10	2.179
19 8:00:00 PM	10	1.439
19 9:00:00 PM	10	1.480
19 10:00:00 PM	10	0.464
19 11:00:00 PM	10	0.916
9 12:00:00 AM	10	0.326

As you can see at 3pm this customers usage appears to have had a high spike in her usage for that one hour when no one was home.

Q. How does the meters being on Phase C affects usage

First you have to understand which service the Company is providing for their customers. For a customer on **RATE A RESIDENTIAL SERVICE** the company states the following:

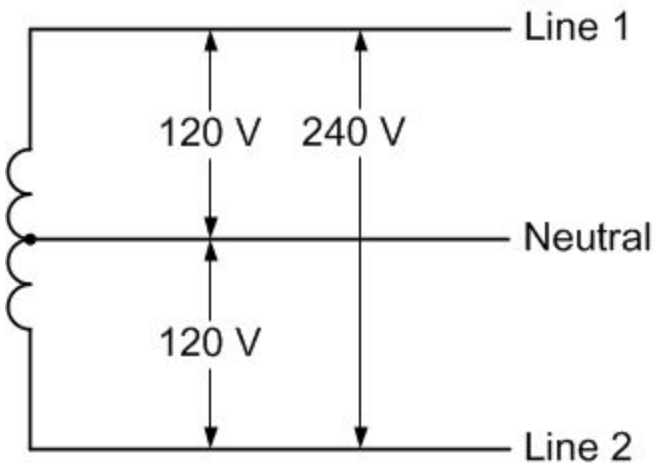
"CHARACTER OF SERVICE

End use service will be single phase, alternating current, 60 hertz, furnished at one standard secondary distribution voltage as described in the Company's Handbook

of Requirements for Electric Service and Meter Installations."

For this to be true, there wouldn't be a Phase C used for residential customers. In ***Figure 3.4.A*** shows a Single Phase Three Wire diagram also known as an Edison system, split-phase or center-tapped neutral. This is the most common residential service in North America. Line 1 to neutral and Line 2 to neutral are used to power 120-volt lighting and plug loads. Line 1 and Line 2 is used to power 240-volt single phase loads such as a water heater, electric range, or an air conditioner. In ***Figure 3.4.B*** shows how a Three Phase Four Wire Wye which is the most common commercial building electric service in North America is 120/208-volt wye, which is used to power 120 volt plug loads, lighting, and smaller HVAC systems. In larger facilities the voltage is 277/480 volt and used to power single phase 277-volt lighting and larger HVAC loads. In order for the Company's statements to be true about customers under registering their usage on Phase C would only be true for commercial and/or industrial customers. Many air conditioners and space heaters currently on the market are between 115v to 120v. Thus, residential customers would more than likely be overcharged by double their usage during the summer and winter months if they happened to be wired for Phase C.

Figure 3.4.A



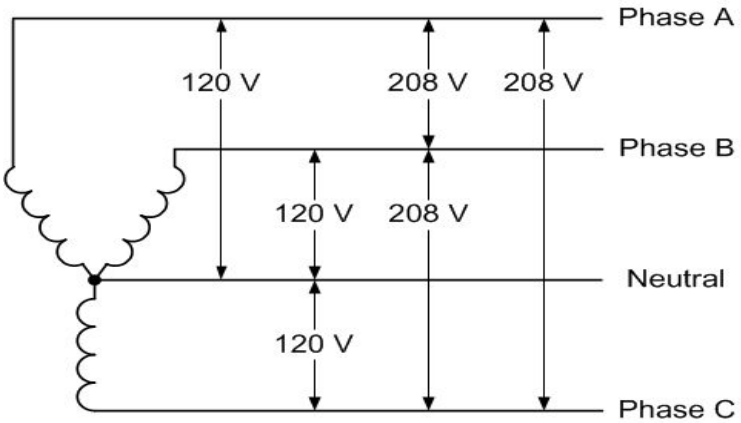


Figure 3.4.B

GE manual states:

2.3.1.5 Power Supply

The I-210+c™ meter is powered from the A-phase voltage line. It has a solid-state switching type power supply. The meter is available in two voltage ratings: 120 V or 240 V, ±20% of rating. The supply operates for either 50 Hz or 60 Hz line frequency. Note: The frequency at which the meter will operate is factory configured; it is not user programmable.

Landis and Gyr manual states:

22.5 Phase Voltage Errors

The FOCUS AX registers the loss of phase voltage by making an exception on the display. The FOCUS AX meter is powered from phase A, so any loss of voltage to this phase drops out the whole meter and is treated as a normal power failure. Losses of the other phases (on form 12S/25S) cause an error message to appear. A phase is considered lost at a user programmable level of the nominal voltage. Based on the programmable option, the phase error display discontinues scrolling either temporarily or completely. Phase error displays automatically disappear when voltage is restored to the phase. Normal scrolling continues automatically.

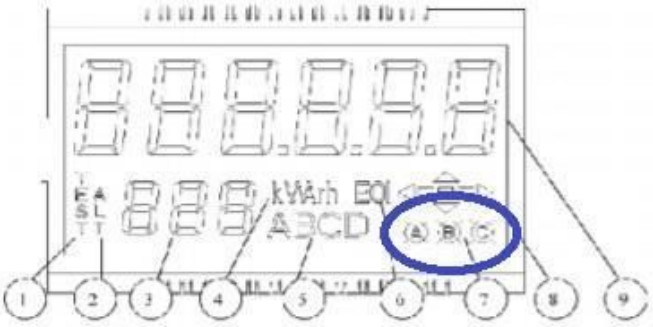
I'm unable to verify CMP statements in regard to the meters operating on Phase C and causing the meter to under register usage. As shown in ***Figure 3.5*** if the meter was connected to a Phase B or C it would be eliminated on the display. If the meters were switching between phases being on phase C

would either show typical usage or would still over register from the meter operating as a demand meter.

Figure 3.5

3.2.2 Liquid Crystal Display Information

Figure 8 Liquid Crystal Display Information



1. The TEST annunciator indicates the meter is in Test mode.
2. The ALT annunciator indicates the meter is in Alternate Display mode.
3. The three small digits are used to display the current display label or code. CA or Er appearing in this location indicates a Caution or Error message in the display.
4. These letters are used to display the units of measure for the quantity currently being displayed. For example, energy displays will have a kWh annunciator and Apparent Power will have a kVA annunciator.
5. The letters A through D indicate the time-of-use (TOU) rate that is in effect. Only one letter at a time is displayed when the meter is operating in TOU Mode. If no letters are lit, the meter is in a non-TOU rate.
6. This display indicates an end-of-interval (EOI) condition.
7. When displayed, the A annunciator indicates the A voltage is present at the meter. If this annunciator is blinking, phase-A voltage is low.

   The B annunciator will only be displayed during an all segments display.

Under LOO-001-001 the Company states the following “The meter anomaly vulnerability is present regardless of whether or not a battery is present within the meter.”

If that statement is true, that would mean that meters will continuously operate in the meter anomaly. On page 20 of the GE manual it states:

“**2.1.6 Demand/Load Profile Operating Mode Demand/load** profile mode **requires a battery or super capacitor** and the R2 load profile recording softswitch. The following features are provided in addition to the basic features provided by the meter in demand mode:

Load profile recording for up to four channels

Daylight savings time change support

2.1.8 TOU/Demand and Load Profile Operating Modes TOU/demand and load profile mode requires a battery or super capacitor and the T2 time-of-use and R2 load profile recording softswitches. The following features are provided in addition to the basic features provided by the meter in TOU/demand mode:

Load profile recording for up to four channels “

If this is true this would mean all TOU, Demand, and Load profile meters will all require a battery to operate as intended otherwise the meters will be operating as a default demand meter.

Q. How can the anomaly be corrected?

If there is no battery present the meter will continue operating in an erroneous mode once power is restored unless the meter is manually reset or if the meter's firmware was upgraded to 2.5.7.0. Ideally the patch would need to provide a simple scheme or code to prevent erroneous operation by placing a loop in the PLL_OK interrupt. This loop polls PLL_OK, and if the PLL has recovered because power has been restored, it performs a soft-reset to start-up the meter. This is because when the meter is in **SLEEP** mode and transition back into MISSION mode many components are in a reset state. The PC will be at 0x0000, the XRAM is in an undefined state, and the I/O RAM is only partially preserved. Any usage recorded in this state needs to be discarded and estimated readings used.

Q. Does this affect other meters?

Yes. In ***Figure 3.6.A*** and ***Figure 3.6.B****,* there is mention of a Teridian processor becoming unconfigured. Teridian is a single-chip energy meter integrate all primary functional blocks required to implement a solid-state electricity meter. They are found in 52 manufacturers, including General Electric, Landis+Gyr and Elster. This chip is the source of the meter anomaly. It was not designed to operate without a backup battery and will need the meter's firmware to be reconfigured to allow battery free operations.

Figure 3.6.A

Figure 3.6.B

If the meter's firmware is not upgraded, the chip becomes unconfigured due to the battery not being installed. In the Landis & Gyr meters, if the battery is not present or has a low voltage it will enter into **STAND-BY** mode. The meter will need a "**cold start"** to operate normally again. Now if the meter is also a TOU meter the meter will enter into **STAND-BY** mode and will refuse any request to reset the meter or to update it's Real Time Clock. The meter will need to be reset in the field. Teridian states "After battery power is lost, the Real Time Clock will read the year 2001, the month January, and the day 1 (2001/01/01). The time information will be 01:01:01. If the MPU firmware program detects the date 01/01/2001 upon power-up or reset, it is safe to conclude that the RTC is corrupted, most likely due to a missing or low-voltage battery." This

time is mentioned in an email on a Landis & Gyr meter. The Company is aware of this and have turned off those notifications as well. See ***Figure 3.7***

Figure 3.7

LANDIS & GYR STANDBY-MODE

Starting on page 27 of the Landis+Gyr E330 FOCUS AX and E350 FOCUS AX-SD Manual, which I have attached as ***Exhibit 2,*** explains the **Standby-Mode** for either software version. The Company stated in an email the meters might have the firmware version 5.34.

"**12.2.1 Stand-by in Firmware 5.31 to 5.33**

The meter continues to register Delivered kWh, Received kWh, and Total kWh demand values. All TOU and LP recording is suspended. It is not possible to use the

service disconnect while in stand-by mode. The meter ignores all demand reset commands. For subsequent outages in which time is lost again, the meter records an exit stand-by event at the time of the power loss, and then proceed to enter stand-by as normal.

12.2.2 Stand-by in Firmware 5.34 and later

In firmware 5.34 (FOCUS AX) 5.62 (FOCUS AXe) and later, stand-by mode records Load Profile data. The meter stores up to 20 days of load profile information (1 channel) in 15 minute intervals for up to 3 months (see table 12.2.3 below). All power up and down events are recorded as in normal operation. The TOU rate and season are retained from before the power loss and do not change due to any calendar event. Self reads and season changes are skipped. The rate enunciator remains off. On subsequent power outages in which the time is lost, the meter creates a new stand-by start event Selection in 1132Prog to allow Stand-by Mode and to enable or disable LP merging. Go To Table Of Contents 28 in the log, but no stop event. The clock error is retained until either the time is set or a cold start is performed, and is not reset with a “Clear Standard Status flags” request. Test mode remains available, and data is not logged while in this mode (as normal). The meter can be programmed to merge the stand-by data with normal load profile data using the current time as a reference point upon exiting stand-by via a time set. When a meter is powered in Stand-By mode it will record total kWh (energy values). Regular load profile quits recording and Stand-By load profile starts recording. When the meter time is reset, the meter will take the data accumulated during Stand-By and insert it into the regular load profile. There will be no time associated with the data recorded during Stand-By. Use of a battery will retain all data and associated time. Data would be retained for as long as the battery held out. Once load profile is full you lose one interval of your oldest data each interval, power outage or not.”

On page 30 of the manual explains how the meter operates after a cold start.

“**COLD START**

A cold start initializes all memory and returns the register to an un-programmed state. In this state, the register accumulates energy and demand data for 15-minute intervals and shows each metric in the default display during this condition. Test mode is not available. A cold start may be accomplished in two ways: optically or by a manual switch sequence that requires breaking the meter cover seal. Caution: Cold starting a device results in an irreversible loss of billing data and the meter program.

14.1 Method 1, Optical Cold Start

1.In 1132 Com select RESET then Cold Start.

2. In 1132 Com a warning box to verify the cold start appears.

3. The message “Cold Start Complete” should appear to verify the cold start.

14.2 Method 2, Manual Cold Start

1) Hold the scroll switch for at least 6 seconds to enter fast scroll mode. 2) Release the scroll switch and press and hold the reset switch within 2 seconds. At this point the display is blank.

3) While still holding the reset switch down, within 2 seconds rapidly lift and then close the test mode switch.

4) Release the reset switch. If the steps are not completed correctly and within the proper time sequence, the word “abort” shows on the LCD display. A demand reset occurs when the reset switch is pressed, but the cold start will not have occurred.

14.3 Register Displays following a Cold Start

After the meter is cold started, the display auto-scrolls through a power-up display sequence and then stops on the error code 000010. To review the power-up display sequence, please consult the section later in this manual entitled “Power-Up/Cold Start Displays”. “

On page 38

20.6 Power-Up/Cold Start Displays

Upon powering up, the meter auto scrolls through a power-up display sequence then stops on the error code and displays error(s) present. The power-up display sequence shows five displays in Normal Mode: 1) DSP version 2) Firmware revision 3) Total kWh* 4) Maximum kW* 5) All-segment 6) Blank, or state of Service Disconnect switch The following three displays are available in the Alternate Mode: 1) Full Load as left 2) Light Load as left 3) Power Factor as left The following three displays are available in the Test Mode: 1) Total kWh 2) Max kW 3) Instant kW *The default (cold-start) program measures kWh and kW on a 15 minute block interval. If the meter is programmed, auto scrolling continues with the programmed displays after the catch-up period.

Found on page 41.

22.2 Error Conditions

Low Battery

The error is set when the battery voltage drops to 2.5 ± 0.2 volts. The battery voltage is automatically checked each day at 4 a.m. A check of the battery may also be initiated manually by actuation of scroll switch, actuation of Test mode, and each time a Demand Reset is performed. Note: A good charge on the Super Cap does not mask the state of a bad battery. Suggested action: Install a new battery and perform a battery retest as described above.

Un-programmed

This error is set upon completing a **Cold Start**. Suggested action: Program the meter using 1132Com.

22.3 Disabling Individual Error Codes

Each error code has a programmable mask to allow the reader/programmer to enable or disable individual error conditions. Each error code is flagged by the meter but is not displayed. The reader/programmer may clear any error condition by toggling the appropriate mask bit. If cleared, the meter retests for the error. “

In ***Figure 3.8.A***, you can see the usage from a customer who had a Landis & Gyr meter usage doubled after a power outage. This customers meter and dispute was left out of both the customer

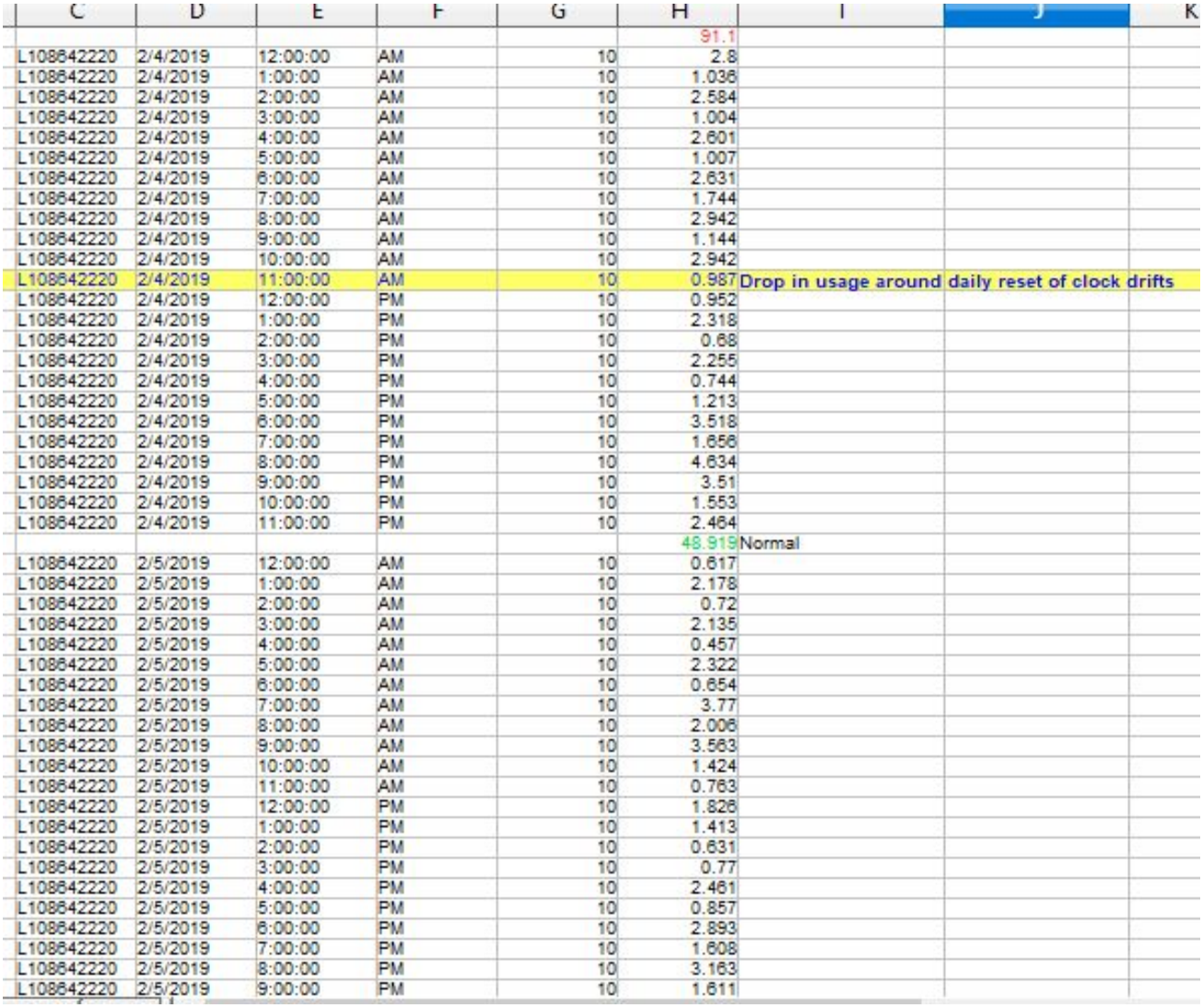
complaint list and complaint meter list, TLCG-001- 073_Attachment_2_CONFIDENTIAL_(2018-052)

C	D	E	F	G	H	I
L108642220	2/2/2019	2:00:00	AM	10	0.413	
L108642220	2/2/2019	3:00:00	AM	10	0	POWER OUTAGE
L108642220	2/2/2019	4:00:00	AM	10	0	
L108642220	2/2/2019	5:00:00	AM	10	0	
L108642220	2/2/2019	6:00:00	AM	10	0	
L108642220	2/2/2019	7:00:00	AM	10	0	
L108642220	2/2/2019	8:00:00	AM	10	0.847	
L108642220	2/2/2019	9:00:00	AM	10	8.774	
L108642220	2/2/2019	10:00:00	AM	10	4.033	
L108642220	2/2/2019	11:00:00	AM	10	4.296	
L108642220	2/2/2019	12:00:00	PM	10	2.587	
L108642220	2/2/2019	1:00:00	PM	10	3.947	
L108642220	2/2/2019	2:00:00	PM	10	1.79	
L108642220	2/2/2019	3:00:00	PM	10	3.373	
L108642220	2/2/2019	4:00:00	PM	10	1.762	
L108642220	2/2/2019	5:00:00	PM	10	3.359	
L108642220	2/2/2019	6:00:00	PM	10	3.052	
L108642220	2/2/2019	7:00:00	PM	10	3.277	
L108642220	2/2/2019	8:00:00	PM	10	3.816	
L108642220	2/2/2019	9:00:00	PM	10	3.32	
L108642220	2/2/2019	10:00:00	PM	10	4.028	
L108642220	2/2/2019	11:00:00	PM	10	2.194	
					62.44	
L108642220	2/3/2019	12:00:00	AM	10	3.899	
L108642220	2/3/2019	1:00:00	AM	10	3.296	
L108642220	2/3/2019	2:00:00	AM	10	2.114	
L108642220	2/3/2019	3:00:00	AM	10	2.824	
L108642220	2/3/2019	4:00:00	AM	10	2.861	
L108642220	2/3/2019	5:00:00	AM	10	1.202	
L108642220	2/3/2019	6:00:00	AM	10	2.782	
L108642220	2/3/2019	7:00:00	AM	10	2.606	
L108642220	2/3/2019	8:00:00	AM	10	3.175	
L108642220	2/3/2019	9:00:00	AM	10	3.503	
L108642220	2/3/2019	10:00:00	AM	10	3.596	
L108642220	2/3/2019	11:00:00	AM	10	5.015	
L108642220	2/3/2019	12:00:00	PM	10	5.537	
L108642220	2/3/2019	1:00:00	PM	10	4.372	
L108642220	2/3/2019	2:00:00	PM	10	1.352	
L108642220	2/3/2019	3:00:00	PM	10	6.229	
L108642220	2/3/2019	4:00:00	PM	10	6.592	
L108642220	2/3/2019	5:00:00	PM	10	2.495	
L108642220	2/3/2019	6:00:00	PM	10	2.586	
L108642220	2/3/2019	7:00:00	PM	10	5.041	
L108642220	2/3/2019	8:00:00	PM	10	7.355	
L108642220	2/3/2019	9:00:00	PM	10	3.097	
L108642220	2/3/2019	10:00:00	PM	10	6.217	
L108642220	2/3/2019	11:00:00	PM	10	3.354	
					91.1	

Figure 3.8.A

In ***Figure 3.8B***, you can see the customer's usage dropped back down to his typical usage around the time the Company mentioned they perform the daily clock drift resets.

Figure 3.8B



C	D	E	F	G	H	I	J	K
					91.1			
L108642220	2/4/2019	12:00:00	AM	10	2.8			
L108642220	2/4/2019	1:00:00	AM	10	1.036			
L108642220	2/4/2019	2:00:00	AM	10	2.584			
L108642220	2/4/2019	3:00:00	AM	10	1.004			
L108642220	2/4/2019	4:00:00	AM	10	2.601			
L108642220	2/4/2019	5:00:00	AM	10	1.007			
L108642220	2/4/2019	6:00:00	AM	10	2.631			
L108642220	2/4/2019	7:00:00	AM	10	1.744			
L108642220	2/4/2019	8:00:00	AM	10	2.942			
L108642220	2/4/2019	9:00:00	AM	10	1.144			
L108642220	2/4/2019	10:00:00	AM	10	2.942			
L108642220	2/4/2019	11:00:00	AM	10	0.987	Drop in usage around	daily reset of clock drifts	
L108642220	2/4/2019	12:00:00	PM	10	0.952			
L108642220	2/4/2019	1:00:00	PM	10	2.318			
L108642220	2/4/2019	2:00:00	PM	10	0.68			
L108642220	2/4/2019	3:00:00	PM	10	2.255			
L108642220	2/4/2019	4:00:00	PM	10	0.744			
L108642220	2/4/2019	5:00:00	PM	10	1.213			
L108642220	2/4/2019	6:00:00	PM	10	3.518			
L108642220	2/4/2019	7:00:00	PM	10	1.656			
L108642220	2/4/2019	8:00:00	PM	10	4.634			
L108642220	2/4/2019	9:00:00	PM	10	3.51			
L108642220	2/4/2019	10:00:00	PM	10	1.553			
L108642220	2/4/2019	11:00:00	PM	10	2.464			
					48.919	Normal		
L108642220	2/5/2019	12:00:00	AM	10	0.617			
L108642220	2/5/2019	1:00:00	AM	10	2.178			
L108642220	2/5/2019	2:00:00	AM	10	0.72			
L108642220	2/5/2019	3:00:00	AM	10	2.135			
L108642220	2/5/2019	4:00:00	AM	10	0.457			
L108642220	2/5/2019	5:00:00	AM	10	2.322			
L108642220	2/5/2019	6:00:00	AM	10	0.654			
L108642220	2/5/2019	7:00:00	AM	10	3.77			
L108642220	2/5/2019	8:00:00	AM	10	2.006			
L108642220	2/5/2019	9:00:00	AM	10	3.563			
L108642220	2/5/2019	10:00:00	AM	10	1.424			
L108642220	2/5/2019	11:00:00	AM	10	0.763			
L108642220	2/5/2019	12:00:00	PM	10	1.826			
L108642220	2/5/2019	1:00:00	PM	10	1.413			
L108642220	2/5/2019	2:00:00	PM	10	0.631			
L108642220	2/5/2019	3:00:00	PM	10	0.77			
L108642220	2/5/2019	4:00:00	PM	10	2.461			
L108642220	2/5/2019	5:00:00	PM	10	0.857			
L108642220	2/5/2019	6:00:00	PM	10	2.893			
L108642220	2/5/2019	7:00:00	PM	10	1.608			
L108642220	2/5/2019	8:00:00	PM	10	3.163			
L108642220	2/5/2019	9:00:00	PM	10	1.611			

Q. How do we find out how many customers were affected by the fast clock anomaly?

Both the GE and Landis & Gyr meters are able to save 200 events locally on the meters and can be accessed by connecting to their optical ports. Each time there was a power outage, a sag event, or when the meter reset itself they are logged in the meter. The GE meters will record caution codes. Some examples of those codes are:

a. **4.13.2.1 CA 000001—Low Battery**

The Low Battery caution indicates a weak or missing battery. The meter periodically tests the battery. The meter sets the Low Battery caution if the battery voltage is low. The Low Battery caution is cleared when the battery test passes. The meter tests the battery under the following conditions: Power up 1st of each month (00:16) Activation of the Display Switch (not in Test Mode) MeterMate™ Meter Communication command

b. **4.13.2.2 CA 000010—Unprogrammed**

The Unprogrammed caution indicates that the meter is not programmed and is functioning in a **default demand mode**. The meter is shipped unprogrammed unless it is ordered factory programmed. The MeterMate™ Meter Communications Unprogram command will put the meter into the Default Demand mode and set the Unprogrammed caution. Programming the meter clears the Unprogrammed caution.

c. **4.13.2.3 CA 000040—Loss of Program**

The Loss of Program caution indicates that a programming session was interrupted. The meter sets the Loss of Program caution when a programming session is terminated abnormally. The meter will roll back to the last good program and operate from it. If a meter has a Loss of Program caution, reprogram the meter and the Loss of Program caution will be cleared.

d. **4.13.2.4 CA 000050—Unprogrammed and Loss of Program**

The Unprogrammed and Loss of Program caution indicates that a programming session was interrupted while the meter was operating in default demand mode. The meter sets the Loss of Program caution when a programming session is terminated abnormally. The meter will roll back to the default demand program and operate from it. If a meter has an Unprogrammed and Loss of Program caution, reprogram the meter and the Unprogrammed and Loss of Program caution will be cleared.

The Company should have been aware of these caution codes when they first investigated the error code Er 002 and event code 11. Considering the caution code **4.13.2.2 CA 000010—Unprogrammed** is related to the "fast clock" anomaly. I would suggest starting with each high bill complaint over the past 6 years and check their meters logs. Not all event or

caution codes will be present considering the timeframe of how long the erroneous operating mode have been active but enough should be present to verify if the meter were affected or not. If the meter was affected then it's safe to expand to the radius to other meters on the same circuit considering they would have lost power or have had similar sag events.

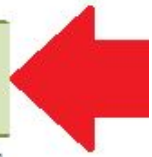
Prior to September 2017 the MDMS did have the data validation, estimation, and editing (VEE) standards implemented and would be used to identify problematic data and address data quality issues. The hourly interval data was used for billing in the past and is still used for billing today as the meters will save usage hourly and then transmit those readings either to the HES or to the MDM system at midnight every day. What we see on the meter display is the total amount of those hourly interval data. Those hourly interval data is still viable in finding if and when a customer was affected by the metering anomalies. They can still be used to adjust customers bills.

The MDMS can perform this with automated data processing. Why the Company decided not to take full advantage of this on their MDMS or why the VEE software was later removed during Smartcare implementation is unknown and concerning. If the Company used the VEE software at its full potential they could have had the erroneous readings corrected and not impact customers. They could have corrected those anomalies this whole time while they waited on the over-the-air (OTA) upgrade to be implemented. When running the data processing program on the MDMS it will be looking for suspect data. In ***Table 3.1*** suggests how the find Suspect Data and the root cause. The table shows how a large positive consumption value with no offsetting negative consumption would be a possible reason for Suspect Data. It even suggests the meter needs a reset or restart to correct the problem. Any data marked as Suspect data should be discarded and an estimated reading used. The process will then fill in any suspect data as NULL

which will make the data ready for the gap filing process.

Table 3.1 Possible Reasons for Suspect and Missing Data in Metered Energy Data

Types of Suspect Data	Possible Reasons for Suspect Data
Negative consumption with offsetting positive consumption	Meter, sensor, or communication errors because of broken equipment or software malfunctions
	Loss of power or service to the building, meter, or data communication device
Negative consumption with no offsetting positive consumption	Meter, sensor, or communication errors because of broken equipment, software malfunctions, equipment replacement, or reset/restart
Large positive consumption values with no offsetting negative consumption	Meter, sensor, or communication system replacement or reset/restart
"0" consumption	Meter, sensor, or communication errors because of broken equipment or software malfunctions
	No electricity use during that time period
Missing timestamps or data gaps	Loss of power or service to the building, meter, or data communication device



Q. Why hasn't this issue with usage come up before the change to SmartCare?

When the Smart meters were installed I remember seeing news reports about customer's reporting high bills. At that time the company stated it was due in part because of the older analog meters running slower. In my case, my bill increased by 20 to 25% a month in usage since the smart meter was installed. When I filed my complaint back in Feb 2018 on my high December bill, my usage dropped below average or to my usage before the smart meter was installed. I had questionable bills over the years that I remember to this day. One bill was over 1000kwh for a month. If it wasn't for the CMP Ratepayers Unite Facebook group I wouldn't have known my right to dispute a bill and just kept paying bills that didn't add up. I've lived at my current home for 10 years. When I first called CMP in 2012 about my usage increase the Customer Service Representative worked with me for over an hour and said my usage increased because of my old refrigerator. I still have the same refrigerator. There are members in the group who have stated they have been fighting CMP for years over high bills and gave up. I'm certain each high usage complaint over the years would match a fast clock event. Mine do. I'm able to download my hourly interval usage dating back since October 2011. I have days of double usage in some months that was used for my total usage for the month on my bill. I did notice from 2015 up until the go live of Smartcare, my bills and hourly usage were more stable but still 20% higher a month on average. When I received my December 2017 bill and noticed my usage was high as if I had my 3 AC's in I knew something was wrong. My usage between 2015 to October 2017 coincided with the timeframe CMP was looking into the anomaly again. I have concluded the issues with high usage complaints have reappeared could be because of the billing defects

and the number of exceptions Smartcare has created which caused the Company to be unable to manage the work around on the metering anomalies. Since the Company removed the VEE software from the MDM they are unable to fix the erroneous readings. They would need to investigate every bill manually and correct them, issue an estimated bill, or actively reset every meter daily. They were unable to do the work around due to the mounting of delayed bills from their new SmartCare system.

ERT and AMR Meters

For customers who have an electromechanical meter and are experiencing high usage complaints could be affected by a human error, or billing defect, or have had their meter retrofitted or come preinstalled with a meter module that transmits data. The technology is used to transmit data from utility meters over a short range (100ft) so a utility vehicle can collect meter data without a worker physically inspecting each meter. They are often referred to an Encoder Receiver Transmitter (ERT) or Automated/Automatic Meter Reading (AMR) meter. The Encoder receiver transmitter (**ERT**) is a packet radio protocol developed by Itron for automatic meter reading. Depending on the model the company is using, this type of meter could be affected by the similar meter anomaly as the smart meters. Some models would still be considered a smart meter but would be retrofitted with what is called a "Clock or dial Display" verses the smart meters typical digital display. The meter's boards and chips would be the same and would have a Teridian processor.

During a news broadcast back in January 2019, CMP spokesperson Catharine Hartnett quoted the following statements in regard to a particular type of analog meter being affected by an anomaly:

"As of today, it's been resolved," said CMP spokesperson Catharine Hartnett.Hartnett blames the problem on human error.

She said the Scarborough facility has one of 35 non-standard, analog meters. In this case, she said the meter was not properly installed or connected to the billing system.

"We have so few of these particular kinds of analog meters, and then in this case, this was the only one that wasn't connected properly," Hartnett said.

She said the company also made a mistake when manually entering a meter reading, which carried over for months

"In this particular case, it is an anomaly," she said. "It has nothing to do with the billing system. It has to do with how the meter was set up."

Was this a human error or an anomaly? Both?

Customers who may have an ERT or AMR meter would be the MV-90 customers and some residential customers who have opted out of having a smart meter. When I hear from members who are reporting their analog meters are running high in usage then all of a sudden there's a sudden steep drop that they can't explain I have to ask them to send me a picture of their meter to verify it is an analog meter because it is sounding a lot like the fast clock anomaly. I would recommend The Liberty Consulting Group to further audit these customers' accounts and meters to figure out if they're affected by a meter anomaly, human error, or billing defects. Commercial

and Industrial customers deserve the same protections as residential customers during this time considering the number of defects and manual processes for the MV-90 customers the company had to perform since the go live of Smartcare.

Registry Anomaly

The registry anomaly appears to only affect the GE I-210+C meters. This has to do with a sequence of events when the power begins to fail or a sag event has occurred. During a power outage or a sag event a sag timer will be triggered to store all billing data before the power to the meter is lost. Due to not having a backup battery a firmware upgrade is needed to change the sequence to allow the EEPROM to save the data before the power is lost to prevent saving any erroneous data to EEPROM and without entering an unrecoverable state. During the Sequence of Events when Power Fails if the power is lost or there's a drop-in voltage is below 2.6v the meter will enter into sleep mode because the battery is not present. This causes the Registry anomaly. The manual for the meter states on page 51:

4.13.1.3 Er 000200—Non-volatile Data Error

"The Non-volatile Data error indicates a failure in the memory used to store configuration information, billing data, self-reads, event logs, and load profile data. When the meter is not communicating, it continually tests the integrity of the data stored in non-volatile memory. If the meter detects an error in the non-volatile data, it sets the Non-volatile Data error. If subsequent tests pass, the error is cleared. A meter with a persistent Non-volatile Data error should be removed from service and returned to GE."

This event is also recorded and logged. I did not read in the company's emails if this flagged event notification was also turned off. In most cases customers should have been receiving an estimated bill. Prior to the go live of SmartCare their estimated readings should have been closer to the typical usage and the anomaly would go undetected.

In ***Figure 3.9*** below shows the information related to the firmware update that corrects this anomaly.

Figure 3.9

IV. CLOCK DRIFTS

CLOCK DRIFTS

The Trilliant SECUREMESH is designed to flag any meter time that is off by 5 minutes. If a meter clock has drifted out of sync with the network clock and is not adjusting it's clock to the correct time after multiple failed requests made by the network time protocol (NTP) then the meter is not operating as intended and a root cause as to why the meter is not adjusting it's time should be flagged and further investigated. In sleep mode, the Real-Time Clock (RTC) inputs to the clock generator are forced low. This would be why the meters are appearing to be behind in time. If there is no battery when system power returns, all configuration bits will be in reset state and RTC and MPU RAM data will be unknown and must be initialized by the MPU. The meters clock is unable to respond to the NTP because it needs to be restarted. The meter's date and time must be set. Trilliant and the meters are flagging these events. On TLCG-001-199_Attachment_1_CONFIDENTIAL_(2018-052)_Trilliant_TimeSync on page 3 states:

5.1 Standard SecureMesh Module Real-Time Clock Synchronization

The Standard SecureMesh module in a basic residential meter synchronizes its clock to the SecureMesh NAN (typically every 30 minutes) based on the network time propagation process described above. An offset as small as one second will then initiate the time-smoothing algorithm described below:

- If the offset between the Standard SecureMesh module's time and the Collector/Bridge's is

≥ 1 second but < 5 minutes, the Standard SecureMesh module gradually adjusts its real-time clock to the correct value without any notification to the head-end system. The adjustment period required to adjust the real time clock is controlled by the *correction factor* selected by the utility.

- If the offset is ≥ 5 minutes but < 15 minutes, the Standard SecureMesh module gradually adjusts its real-time clock to the correct value, the "clock error" flag is raised, and, if the device is configured to send error reports in the event of time management issues, then a "clock drifted, trying to re-synchronize" error is generated and will be reported to the head end as configured. The utility also has the option to individually initiate a "set clock" command to the SecureMesh module in order to directly set the clock to its correct value without incrementally adjusting the clock gradually.

- If the offset is ≥ 15 minutes, no clock adjustment is performed, the "clock error" flag is raised, and the Standard SecureMesh module generates a "clock drifted out of tolerance" error to be reported to the head end. In order to correct the clock, the head end must initiate a "set clock" command to the Standard SecureMesh

As stated above if the device is configured to send error reports in the event of time management issues each event has a specific error generated. If the "Set clock" command does not work or the meter clocks continues to drift the meter will need to be reset. This is not a clock drift but an anomaly. In sleep mode or standby mode the meter clock must be restarted or it will either ignore any commands to set its clock or continue to drift.

When a sag event occurs, this causes specific events to be triggered within the meters. the meter clock will speed up. On exhibit LOO_Exhibit_F_Teridian Meter Design for Power Failure Events, describes this process but the process also shows an updated firmware being used. Without the updated firmware the process would be hung up in "SLEEP MODE" and the meter would need to be reset.

V. COMPENSATING CUSTOMERS

Compensating customers for the billing issues will be better addressed within the courts considering many customers were told to pay unaffordable high bills or told to hire an electrician. Some were told to buy new appliances. the MPUC also cannot compensate for the mental anguish and financial difficulties (the need to pay the electric bill or put food on the table, or buy medications) that CMP has put their customers through.

Compensating customers for the metering anomalies could be done through this proceeding. The thought of finding the metering anomalies and how many customers were affected may seem time consuming but that is due in part to the Company's lack of understanding how their Meter Data Management System operates. It could be done while the Company upgrades the meters firmware. At this point, CMP needs to be doing the upgrades in the field. Upgrading the meters firmware would be easy if the meters had a high-speed wireless connection, but they don't. Meters typically send just a few hundred bytes of data to the server each day and rarely need any data to be sent back. To make this efficient, networks are optimized for data being sent from meters, not to them. They are not designed to send firmware update files to millions of meters at the same time. Adding in the fact that Maine has many trees the meters will continue to lose

packets of data due to the interference. The interference is unavoidable, and it continues to prove to be a struggle for the Company. Only 1 meter was successfully upgraded since the Company started the over-the-air upgrades. The Company needs to hire meter readers again to perform those necessary upgrades the meters need in the field. This could have been done before the company eliminated those jobs but for some reason was not performed.

Decreasing rates to compensate customers should be out of the question. Many customers have seen an increase by 2 to 4 times their typical usage.

The Company should have known when each meter test was performed if the meters were operating in the default meter mode or "fast clock" by simply looking at the meter. In ***Figure 5.1.A***, I circled in red the display for TOU or Time Of Use Rates. Seeing the A, B, C, or D means the meter is not operating as a totalizing (kWh) meter but as a default demand meter and needs to be reset. On ***Figure 5.1.B***, I've circled on my own meter showing a TOU rate B.

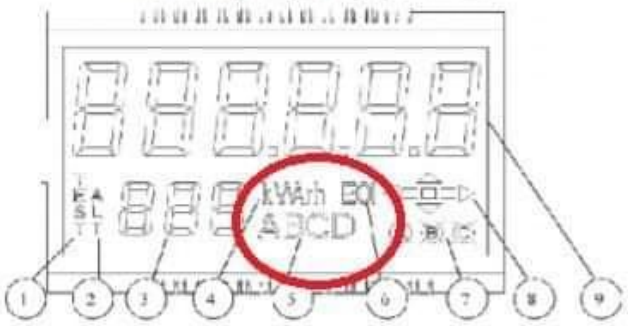
Customers who were not affected by a meter anomaly should have their account individually verified that their account information including the meter are, in fact, accurate and were not switched by a human error from an inadequately trained customer service representative. This past month we have been hearing from members that their meter is not matching the meter number listed on their bill or on their XML data files of their hourly interval data provided by the Green Button. They are concerned if their usage is below their typical usage and is because of their account being switched that they will end up owing for being underbilled. They are afraid of coming forward in fear of having a large bill they will not be able to afford. They are also afraid of any retribution from the company and have refused to allow me to share their information in hopes of getting some answers for them. Customers should not be afraid of their utility company or afraid they will encounter a financial hardship due to being presented with the

wrong usage making them believe they were cutting back on their electric usage just to find out it wasn't their usage to begin with and now they owe for the misrepresentation.

Figure 5.1.A

3.2.2 Liquid Crystal Display Information

Figure 8 Liquid Crystal Display Information



1. The TEST annunciator indicates the meter is in Test mode.
2. The ALT annunciator indicates the meter is in Alternate Display mode.
3. The three small digits are used to display the current display label or code. CA or Er appearing in this location indicates a Caution or Error message in the display.
4. These letters are used to display the units of measure for the quantity currently being displayed. For example, energy displays will have a kWh annunciator and Apparent Power will have a kVA annunciator.
5. The letters A through D indicate the time-of-use (TOU) rate that is in effect. Only one letter at a time is displayed when the meter is operating in TOU Mode. If no letters are lit, the meter is in a non-TOU rate.
6. This display indicates an end-of-interval (EOI) condition.
7. When displayed, the A annunciator indicates the A voltage is present at the meter. If this annunciator is blinking, phase-A voltage is low.

   The B annunciator will only be displayed during an all segments display.

Figure 5.1.B

VI. CyberSecurity

The cybersecurity issues have not been fully explored. This is of great concern due to many deficiencies in their security. By not providing the necessary meter firmware updates, using outdated password protocols on their AMI equipment, proposes a substantial risk to that would allow malicious intent and access to a customer's smart meter invading their privacy. By not perform the necessary upgrades or by maintaining their grid this allows access to their network by third party intruders who could perform a number of man in the middle attacks and gain control of their systems. The outdated security protocols

the company currently uses needs to be addressed and overhauled to meet National and State Standards. Passwords using a WEP protocols should be updated if they haven't already. The Company has stated they would be updating all of their outdated passwords but I was not able to verify these steps were in fact performed and completed.

VII. SUMMARY

The Company should have been aware of the metering anomalies and should have known the seriousness of not performing the meter firmware upgrades as being harmful to their customers. Reading the release notes alone verifies to me the need for the updates to prevent customers from being charged for inaccurate usage. I'm not sure if the Company didn't provide all of the documents related to the issues with the GE meters from GE or if GE wasn't aware of the company using the meters without batteries or without upgrading the firmware so they did not provide the correct documentations but there's no excuse for not finding the root cause for 9 years. It took me less than a minute to Google the Teridian processor mentioned in the company's emails and found out the true cause of the anomalies. Not even a minute to look up each meters manual that described their meters operating without batteries. It's highly concerning a utility company does not understand their own meters or even understand what a clock drift truly means. The Commissioner's should hire an independent third-party forensic analyst who specializes in smart meters to investigate my findings on the metering anomalies to find out how severe the over-billing truly is and how many customers are impacted. Also, to find out if CMP was in fact unaware of how their meters operate and continued to wait for years to upgrade the meters.